

REMARKS

The Office Action dated November 20, 2003, has been received and reviewed.

Claims 1-13, 17-26, 31-33, 37-40, and 42-44 are currently pending and under consideration in the above-referenced application, each standing rejected.

Claims 14-16, 27-30, 34-36, 41, and 45-67 have been withdrawn from consideration.

Reconsideration of the above-referenced application is respectfully requested.

Rejections Under 35 U.S.C. § 102(e)

Claims 1-11, 13, 17-26, 31-33, 37-40, and 42-44 stand rejected under 35 U.S.C. § 102(e) for reciting subject matter which is assertedly anticipated by that disclosed in U.S. Patent 6,472,758 to Glenn et al (hereinafter "Glenn").

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single reference which qualifies as prior art under 35 U.S.C. § 102. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

The description of Glenn is directed to multi-chip modules. A multi-chip module that incorporates teachings of Glenn includes an adhesive 40 for use as a spacer layer, or adhesive layer 42, between stacked semiconductor devices. Col. 7, lines 5-11. The adhesive 40 may be filled with microspheres 48. *Id.*

The microspheres 48, which are useful for "precisely controlling the final bond line thickness of the adhesive layer 42 distributed between the opposing surfaces of . . . two dies 14 and 16," (col. 7, lines 1-5 and 12-16) appear to be completely laterally surrounded by the adhesive material 40. In fact, Glenn does not expressly or inherently describe that the microspheres 48 may be used without the adhesive 40.

Further, the disclosure of Glenn appears to be limited to use of solid microspheres 48. *See* col. 7, lines 26-43.

Independent claim 1, as amended and presented herein, recites a semiconductor device for use in a stacked multi-chip assembly. The semiconductor device includes a semiconductor die

and a dielectric spacer layer “secured to” at least a portion of a surface of the semiconductor die. The dielectric spacer layer includes “voids communicating with a lateral periphery thereof.”

Glenn lacks any express or inherent description that the microspheres 48 described therein may be hollow and, thus, include voids therein. Further, assuming, for the sake of argument, that Glenn included some description that microspheres 48 could be hollow (which it does not), the voids that would form the hollow interiors of such microspheres 48 would be contained and, thus, could not communicate with a lateral periphery of a layer formed by or including the microspheres 48.

The description of Glenn is also limited to applying a mixture including microspheres 48 and adhesive 40 to a semiconductor die 14. When these two features of the assemblies described in Glenn are considered together, it is apparent that voids would never be present between adjacent microspheres 48, since adhesive 40 would be located therebetween. Therefore, Glenn neither expressly nor inherently describes a dielectric spacer layer (*i.e.*, the adhesive layer 42 of Glenn) with voids between adjacent microspheres 48, as has been asserted in the outstanding Office Action.

Moreover, Glenn does not expressly or inherently describe a dielectric spacer layer that consists of microspheres 48, without adhesive 40 therebetween, as is apparently asserted in the outstanding Office Action. Even assuming, for the sake of argument, that Glenn did describe a dielectric spacer layer consisting of microspheres 48 with voids therebetween, Glenn lacks any express or inherent description that, without adhesive 40 therebetween, such a layer of microspheres 48 could be “secured to” at least a portion of a semiconductor die (*e.g.*, semiconductor die 14 or 16 of Glenn), as required by amended independent claim 1.

For these reasons, it is respectfully submitted that Glenn does not anticipate each and every element of amended independent claim 1, as is required to maintain a rejection under 35 U.S.C. § 102(e). Thus, under 35 U.S.C. § 102(e), amended independent claim 1 is drawn to subject matter which is allowable over that described in Glenn.

Each of claims 2-11, 13, 17, and 18 is allowable, among other reasons, for depending either directly or indirectly from claim 1, which is allowable.

Claim 6 is also allowable because Glenn does not expressly or inherently describe a dielectric spacer layer that protrudes from a surface of a semiconductor die a distance which is “about the same as or less than a distance a discrete conductive element protrudes above [the] surface” of at least one of the semiconductor die and another, adjacent semiconductor die.

Claim 18 is additionally allowable since Glenn does not expressly or inherently describe a semiconductor device with a dielectric spacer layer that includes “a plurality at least partially superimposed, contiguous, adhered sublayers.”

Independent claim 19, as amended and presented herein, recites a semiconductor device assembly which includes first and second semiconductor devices and a nonconfluent spacer layer therebetween. The nonconfluent spacer layer comprises dielectric material and is secured to a surface of the first semiconductor device. A surface of the second semiconductor device is also secured to the nonconfluent spacer layer.

Again, Glenn lacks any express or inherent description that the adhesive layer 42 described therein is nonconfluent. Rather, the description of Glenn is limited to an adhesive layer which includes adhesive 40 with microspheres 48 dispersed therethrough. As shown in FIG. 6 of Glenn, the adhesive 40 fills all of the spaces between adjacent microspheres.

Even assuming, for the sake of argument, that the microspheres 48 could be used without the adhesive 40 and, thus, form a nonconfluent layer, the microspheres 48 could not be secured to either semiconductor die 14 or semiconductor die 16 without the adhesive 40. But again, the description of Glenn is limited to use of a quantity of adhesive 40 that fills that spaces between adjacent microspheres 48, creating a confluent adhesive layer 42.

For these reasons, it is respectfully submitted that Glenn cannot anticipate both a “nonconfluent spacer layer” and a spacer layer that is secured to surfaces of both a first and a second semiconductor die, as required by amended independent claim 19. Therefore, under 35 U.S.C. § 102(e), amended independent claim 19 recites subject matter which is allowable over the subject matter described in Glenn.

Claims 20-26, 31-33, 37-40, and 42-44 are each allowable, among other reasons, for depending either directly or indirectly from claim 19, which is allowable.

Claim 20 is further allowable because Glenn lacks any express or inherent description of a nonconfluent spacer layer that includes “at least one void therein that communications with a lateral periphery of [the] nonconfluent spacer layer.” Rather, the description of Glenn is limited to mixing microspheres 48 into a quantity of adhesive material 40 prior to placing the microspheres 48 onto a surface of a semiconductor die. Thus, there are no voids in the resulting layer 42.

Claim 21, which depends from claim 20, is also allowable since Glenn does not expressly or inherently describe a spacer layer which includes at least one void that “facilitates lateral introduction of adhesive material between . . . first and second semiconductor devices.” Instead, the description of Glenn is limited to mixing microspheres 48 into a quantity of adhesive material 40 prior to placing the microspheres 48 onto a surface of a semiconductor die. Accordingly, there are no voids in the resulting layer 42 into which adhesive material may be laterally introduced.

Claim 26 is also allowable because Glenn does not expressly or inherently describe a dielectric spacer layer that protrudes from a surface of a semiconductor die a distance which is “about the same as or less than a height the at least one discrete conductive element protrudes above the surface” of at least one of the semiconductor die and another, adjacent semiconductor die.

Claim 31 is additionally allowable since Glenn does not expressly or inherently describe a semiconductor device with a dielectric spacer layer that includes “a plurality at least partially superimposed, contiguous, mutually adhered sublayers.”

Claim 42 is additionally allowable because Glenn neither expressly nor inherently describes a semiconductor device assembly that includes “a plurality of nonconfluent spacer layers between . . . first and second semiconductor devices.”

Claim 43 depends from claim 42 and is also allowable since Glenn includes no express or inherent description of different nonconfluent spacer layers that are secured to opposed surfaces of different, first and second semiconductor devices.

Claim 44 also depends from claim 42, and is additionally allowable since Glenn neither expressly nor inherently describes a semiconductor device assembly with a plurality of at least partially superimposed spacer layers between two semiconductor devices.

In view of the foregoing, it is respectfully requested that the 35 U.S.C. § 102(e) rejections of claims 1-11, 13, 17-26, 31-33, 37-40, and 42-44 be withdrawn.

Rejections Under 35 U.S.C. § 103(a)

Claims 12, 13, and 32 stand rejected under 35 U.S.C. § 103(a).

The standard for establishing and maintaining a rejection under 35 U.S.C. § 103(a) is set forth in M.P.E.P. § 706.02(j), which provides:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Glenn in View of Smith

Claim 12 stand rejected under 35 U.S.C. § 103(a) for reciting subject matter which is purportedly unpatentable over the teachings of Glenn, in view of teachings from U.S. Patent 6,409,370 to Smith, Jr., et al. (hereinafter "Smith").

Claim 12 is allowable, among other reasons, for depending indirectly from claim 1, which is allowable.

Glenn in View of Mueller

Claims 13 and 32 stand rejected under 35 U.S.C. § 103(a) for being drawn to subject matter which is assertedly unpatentable over teachings from Glenn, in view of the subject matter taught in U.S. Patent 6,316,786 to Mueller et al. (hereinafter “Mueller”).

Claim 13 is allowable, among other reasons, for depending directly from claim 1, which is allowable.

Claim 32 is allowable, among other reasons, for depending directly from claim 19, which is allowable.

For these reasons, withdrawal of the 35 U.S.C. § 103(a) rejections of claims 12, 13, and 32 is respectfully requested.

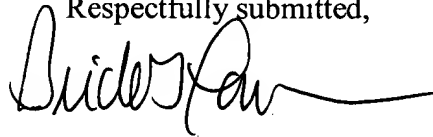
ELECTION OF SPECIES REQUIREMENT

It is respectfully submitted that independent claims 1 and 19 remain generic to all of the species of invention that were identified in the Election of Species Requirement in the above-referenced application. In view of the allowability of these claims, claims 14-16, 27-30, 34-36, 41, and 45-67, which have been withdrawn from consideration, should also be returned to consideration and allowed. M.P.E.P. § 806.04(d).

CONCLUSION

It is respectfully submitted that each of claims 1-67 is allowable. An early notice of the allowability of each of these claims is respectfully solicited, as is an indication that the above-referenced application has been passed for issuance. If any issues preventing allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Brick G. Power", with a long horizontal flourish extending to the right.

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